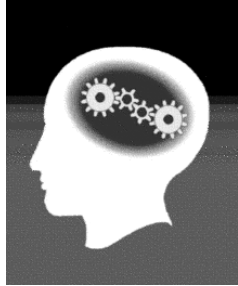


***Critical Thinking &  
Case Study Teaching***

Brian R. Murphy

Department of Fisheries  
and Wildlife Sciences  
Virginia Tech



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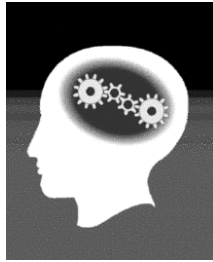
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**Critical Thinking:**

*We think we  
want it in our  
students, but  
what is it?*

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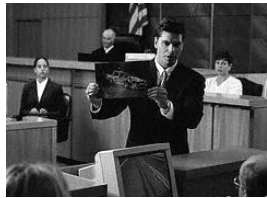


**Critical Thinking:**

*Easy to recognize, but  
difficult to define*



Socrates



Trial lawyer

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**Critical Thinking:**

- "Good" thinking
- "Logical" thinking
- "Rational" thinking
- "Effective" thinking
- "Persuasive" thinking

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**DEFINITION (Paul 1992)**

**Critical thinking is the disciplined mental activity of evaluating arguments or propositions and making judgments that can guide development of beliefs and taking action.**

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**Critical Thinkers Can:**

- Summarize complex ideas
- Evaluate arguments and evidence
- Understand opposing positions
- Draw reasonable conclusions
- Predict logical consequences
- Devise sensible alternatives
- Solve complex problems




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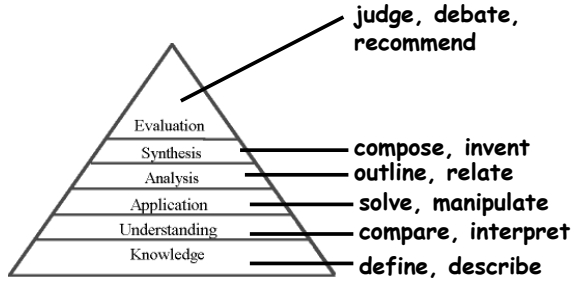
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### Bloom's Taxonomy of Learning (Cognitive Domains)



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*What are the consequences of poor critical thinking?*



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*Poor thinking skills affect people all over the world!*



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Critical thinking is not just for college students, philosophers, and professionals . . .



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*"Until the skills and values of critical thinking become common in our society, we will not achieve a democratic or just society. We will continue to use prejudice, stereotype, distortion, rationalization, and self deception in our thinking. The result of our actions in the world will continue to be unnecessary waste, suffering, and injustice."*

Foundation for Critical Thinking

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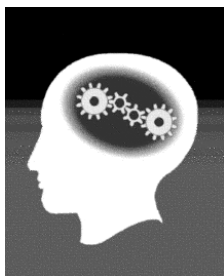
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*How can we teach higher-level thinking skills to our students?*



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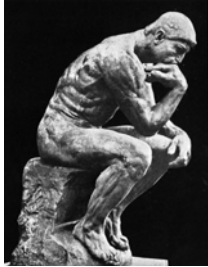
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*How can we teach higher-level thinking skills to our students?*



Get them focused on metacognition  
("thinking about thinking")

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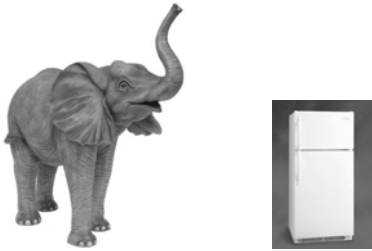
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A QUICK QUIZ ON CRITICAL THINKING

**Q: How do you put an elephant into a refrigerator?**



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**A: Open the door, put in the elephant, close the door.**



*This question tests whether you tend to do things in an overly complicated way.*

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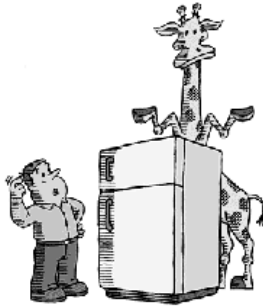
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**Q: How do you put a giraffe into a refrigerator?**



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**Did you answer, "Open the refrigerator, put in the giraffe, and close the door?"**



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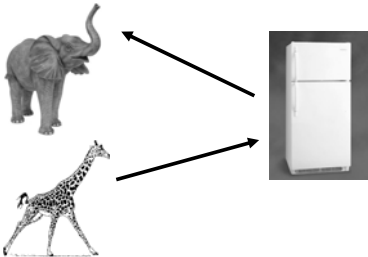
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**Wrong.**

**A: Open the refrigerator, take out the elephant, put in the giraffe, close the door.**



***This question tests your ability to think through the repercussions of your actions.***

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**Q: The Lion King is hosting an Animal Conference. All the animal attend . . . except one. Which animal does not attend?**



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**A: The giraffe. He is in the refrigerator. You just put him there.**



*This question tests your memory.*

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**Q: There is a river you must cross, but it is used by crocodiles and you do not have a boat. How do you manage it?**



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**A: You jump in the river and swim across.  
Have you not been listening? All the crocodiles  
are at the Animal Conference.**



*This tests whether you learn from your mistakes.*

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***Lessons Learned :***

- Read carefully.
- Listen carefully.
- Don't jump to conclusions.
- Question all of your assumptions.



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***Case Study Teaching***

*Case Study: a "real-life" story written  
with an educational mission*



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*Case study teaching does not simply present information, for memorization and regurgitation by students.*



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*Cases teach by asking students to analyze problematic situations. Cases do not give information as much as they ask students to evaluate actions and options, thus leading students to higher-level thinking.*



**Socratic dialog**



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*Case studies teach by asking questions, not by listing answers*



**Medicine**



**Business**



**Law**

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**Best cases put students in real-life situations, to make decisions**



resumption of controversial whale harvest by Japan

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**Case Dimensions**

- 1. Technical
- 2. Political
- 3. Legal
- 4. Cultural
- 5. Ethical
- 6. Economic



*Ivory Poaching in Africa*

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***5 Steps to Effective Problem Solving***  
*(Student-generated)*

- 1. *Define and limit the problem*
- 2. *Formulate relevant approaches*
- 3. *Recognize stated and unstated assumptions*
- 4. *Select pertinent information for the solution, collect more if needed*
- 5. *Draw conclusions, and judge the validity of your inferences*

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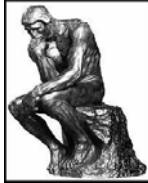
Case study teaching and learning is not easy for students --

*"Sometimes frustrating because you won't give us the answer."*

*"More like real-life problems."*

*"Showed there is no single right answer to complex problems."*

*"More fun than lectures."*



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## Assessment of Case Study Learning

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## USDA Higher Education Challenge Grant

Objectives:

- improve critical thinking skills
- enhance problem-solving and reasoning abilities
  
- Undergraduates in College of Natural Resources, 4 courses in 3 majors
  
- Co-PIs: Jim Parkhust, Steve McMullin, Tom Hammett

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*Blacksburg residents angry over destruction by protected beavers*

*Bluefin tuna driven toward extinction by sushi demand*

*HIV/AIDS leads to forest overexploitation in Africa*




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*Blacksburg residents angry over destruction by protected beavers*

*Bluefin tuna driven toward extinction by sushi demand*

*HIV/AIDS leads to forest overexploitation in Africa*



*Let the cases drive the learning agenda*

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**Multiple Assessment Techniques**

- Standardized testing\*
- Assessment of student writing\*



\* 1) Before and after introduction of case-study teaching and learning  
2) beginning and end of each course

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## Multiple Assessment Techniques

- **Standardized testing**
  - Watson-Glaser Critical Thinking Appraisal
  - Cornell Critical Thinking Test
- **Assessment of student writing**
  - "Microthemes"
  - Assessment rubric adapted from models at Washington State and Kansas State

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## Standardized Tests - Metrics -

### Watson-Glaser

- Inference
- Recognition of assumptions
- Deduction
- Interpretation
- Evaluation of arguments

### Cornell

- Induction
- Deduction
- Observation
- Credibility
- Assumptions
- Meaning

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## Anecdotal Results

### Impressions of Students:

- Familiar with case study teaching: ~70%
- Participated in case study class: ~70%
- Satisfaction with prior exposure: ~30%

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## Anecdotal Results

### Impressions of Students after Day 1:

- *"this is not what I experienced before - this is deep"*
- *"my other 'case-based' classes used cases only as examples, but didn't use them to actually teach the material"*
- *"this is exactly what I'll need when I leave to go to my first permanent job this summer"*

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## Anecdotal Results



### Expressions of Potential Benefit:

- *"real world, everyday examples of what we may be involved with in the future"*
- *"students raise and discuss the topics, not the teacher"*
- *"I thought I was a critical thinker. Obviously, I suck at it after what I saw today. You made me realize how much crap I just accept or take at face value. Man, am I dumb."*

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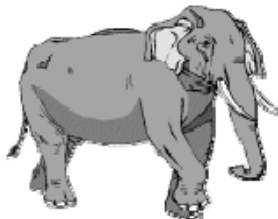
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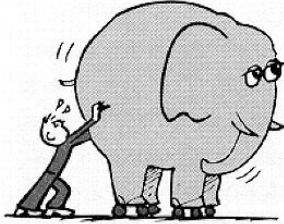
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*Steering the elephant ???*



*Check back in the spring for progress . . .*

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***Diggs Seminar - Spring 2008***

Workshop: Case-Study Teaching and Learning

- How to Develop Cases
- Using Cases in the Classroom
- Assessment Strategies
- Results of our Assessment Project



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*The end . . .*

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